

NN611409107Q - Attachment C

## **SPECIFICATIONS FOR STABILIZED HARVEST ENTRANCE**

### **Definition**

A stabilized harvest entrance provides a pad or mat and drainage protection at any point where equipment will be entering or leaving a harvest site onto a public right-of-way.

### **Purpose**

This practice reduces tracking of sediment onto roads and public rights-of-way and protects existing drainage patterns. Also provides a stable area for entrance into or exit from the site.

### **Condition Where Practice Applies**

This practice applies any place where access to a forest harvest joins a public right-of-way.

### **Specifications**

Each of the following practices provides acceptable stabilized entrances. Select the practice best suited to the particular harvest and availability of materials:

#### **Aggregate Pad**

1. Use two inch to three inch stone, or reclaimed or recycled concrete or its equivalent placed to a thickness of at least six (6) inches.
2. Geotextile Class "SE" shall be placed beneath the stone. The use of paper mill felts as underlayment may be substituted with the approval of the appropriate plan approval authority (the SCD).

#### **Mats**

1. Corduroy mats made from on-site material of six (6) inch minimum diameter.
2. Steel mats designed to support heavy equipment on the existing base.
3. Wooden pads or mats designed to support the equipment on the existing base. These may be constructed by cabling, nailing, or bolting together rough sawn timber that is two inch to eight inches thick. (See SPECIFICATIONS FOR LOGGING MATS.)

#### **Minimum Size of Stabilized Entrances**

1. Width shall be a ten (10) foot minimum, and shall be flared at existing road to provide a turning radius for any equipment using the entrance.
2. Length shall be a fifty (50) foot minimum.

#### Drainage Protection

1. Existing public road drainage shall not be blocked or damaged by access construction. Pipe culverts or a bridge shall be installed if necessary to maintain existing drainage.
2. The drainage pattern shall be restored to its original condition and stabilized upon completion of the harvest.

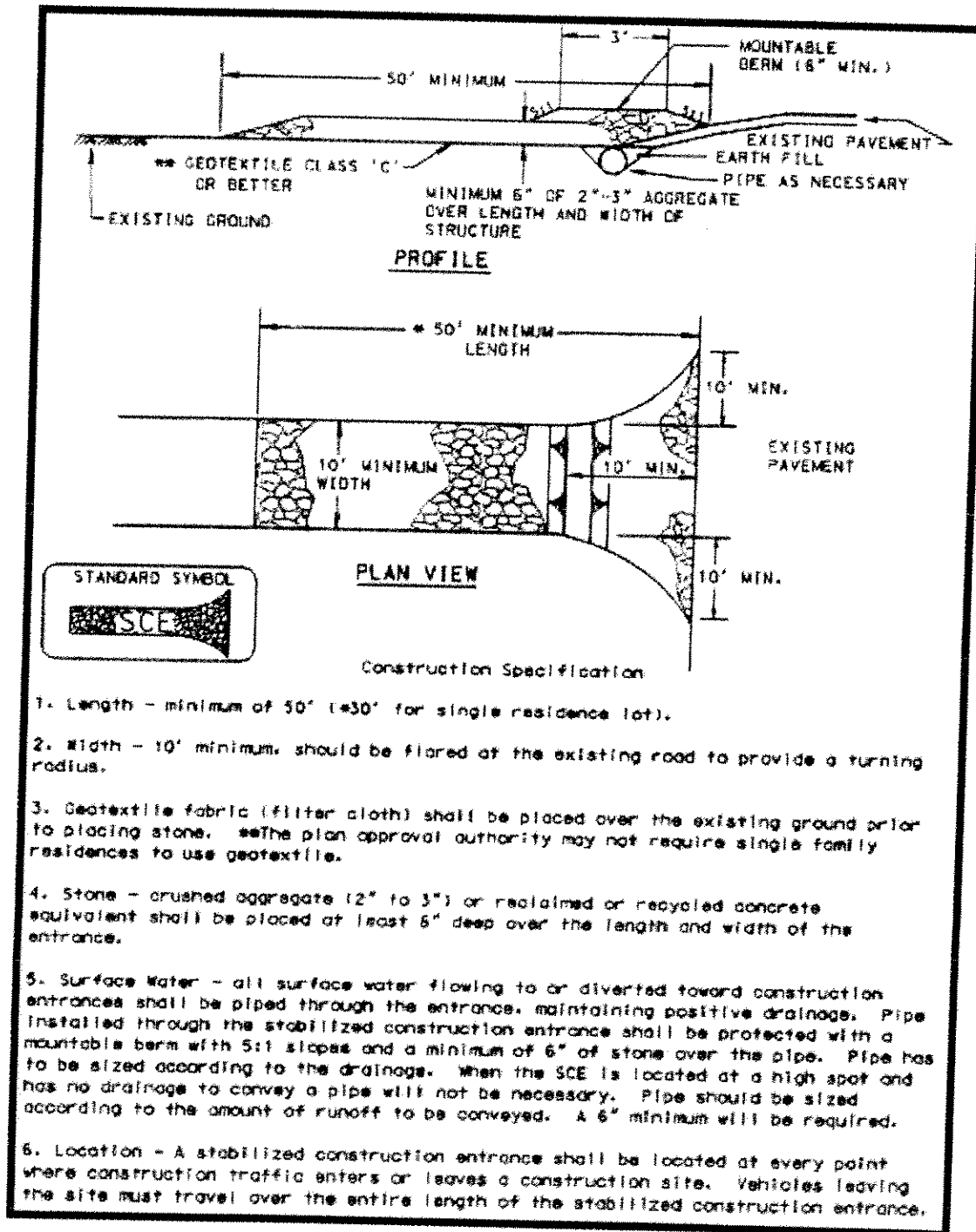
#### Exceptions

1. State and local jurisdictions may have requirements that exceed these minimum requirements for entrance to a public road. A grading or entrance permit may be required for a new entrance onto a county or State road. Obtain details from the plan approval or permitting authority.
2. Alternate materials and methods, such as wood chip entrances, may be used if they accomplish the objectives and are approved by the appropriate plan approval authority (the SCD).

#### Maintenance

1. The entrance shall be maintained in a condition that will minimize tracking of sediment onto a public road. This may require periodic additional top dressing of aggregate or other material.
2. All sediment, spilled, dropped or tracked onto a public right-of-way must be removed immediately and returned to the site.
3. When necessary, truck wheels must be cleaned to remove sediment prior to exiting onto a public right-of-way.

Diagram 2.0 – Stabilized Harvest Entrance



## SPECIFICATIONS FOR TRUCK HAUL ROADS

### Definition

Truck haul roads are part of a road system, temporary or permanent, installed for transportation of wood products from the harvest site by truck. Usually this is an unsurfaced, single lane road with turnouts (wide spots) and is installed by grading with a bulldozer or other mechanical equipment where cuts and fills may be needed.

### Purpose

An efficient transportation system is necessary to effectively protect the forestland and water quality when removing forest products from the harvest site, developing the forest for recreation, accessing the area for forest fire suppression, or implementing other needed forest management activities. Properly located and constructed roads will provide safety, higher vehicle speeds and longer operating periods while reducing operating and maintenance costs.

### Condition Where Practice Applies

This practice applies where the area to be cut and volume per acre makes it necessary and economically feasible for an operator to install a road system.

### Specifications

1. Sound pre-harvest planning allows placement of the haul roads on the flattest ground available and avoids the problems associated with road building on extreme slopes. Roads shall follow the contour as much as possible. Normally, grades shall remain between 2% and 15%. However, grades are permitted to be as steep as 20% for distances not exceeding 200 feet. If steeper grades are necessary, practices must be approved and used to prevent concentrated water flow that causes gullies.  
  
Water diversion by cross drainage (interception of surface water on the road) is often needed to keep excess water off the steeper grades. (See SPECIFICATIONS FOR CROSS ROAD DRAINAGE)
2. Cross intermittent or perennial streams as close to a right angle to the stream as possible, using bridges, culverts or rock fords. Structures shall be sized and placed so as not to impede fish passage or stream flow. (See SPECIFICATIONS FOR TEMPORARY STREAM CROSSINGS.).
3. Install water turnouts prior to a stream crossing to direct runoff to undisturbed areas of the Streamside Management Zone (SMZ). Road gradients approaching water crossings are changed to disperse surface water at least 25 feet from the stream. Locate roads outside of the SMZ (with the exception of stream crossings). (See SPECIFICATION FOR SMZ.) (Use of fords is only acceptable as described in the

Specification For Temporary Stream Crossings.)

4. Outslope the entire width of the road where road gradient and soil type will permit. Usually inslope the road toward the bank as a safety precaution on sharp turns, road gradients of 15%, and on clay, or slippery soils. Use cross road drainage on insloped or crowned roads to limit travel distance of runoff water.
5. Where roads are insloped or crowned, broad-based or rolling dips shall be placed within the first 25 feet of upgrade if gradients begin to exceed 2% for more than 200 feet.
6. Place roads on side slope to avoid level ridge tops. Avoid wet floodplain soils where drainage is difficult to establish.
7. On truck haul roads that intersect main highways, gravel, wooden mats or other means shall be used to keep mud off the highway. (See SPECIFICATIONS FOR STABILIZED HARVEST ENTRANCE.)
8. Provide a minimum width of 10 feet for a single track road. Increase width as necessary at curves and turnouts.
9. Vertical road bank cuts normally are not to exceed three (3) feet in height. This restriction on vertical road bank cuts is increased to five (5) feet in Garrett, Allegany, Washington, and Frederick counties. Any cuts that exceed these limits require special measures to ensure that the created slopes remain stable. These special measures shall be approved by the appropriate plan approval authority (the SCD).  
  
Road bank cuts more than five feet high are normally sloped to at least a 3:1 ratio, but shall in no case exceed a 2:1 ratio, and are stabilized, in accordance with the 7/14 day requirements, to prevent erosion.
10. Good road drainage shall be maintained. Ensure good road drainage with use of properly constructed and spaced turnouts, broad-based dips, rolling dips, culverts or bridges. Turnouts will be constructed so water will be dispersed and will not cut channels across the SMZ. (See SPECIFICATIONS FOR WATER TURNOUTS.)
11. For cross drains install riprap or native stone, if suitable, at the outlets of culverts or dips to dissipate velocity and to limit the disturbance.
12. If necessary to ensure that roads dry out, cut trees alongside of the road to allow sunlight to reach the wet surface. This practice is known as "daylighting".

## Maintenance

1. Restrict traffic on roads during wet conditions. Use of wooden mats and gravel may allow operations during wet soil conditions. Haul only during dry weather on wet soils, erodible soils, or road gradients exceeding 10% that do not have erosion protection.
2. Keep roads free of obstructions, ruts, and logging debris to allow free flow of water from road surface.
3. Control the flow of water on the road surface by keeping drainage systems open at all times during logging operations.
4. Inspect the road at regular intervals to detect and correct maintenance problems.
5. When all silvicultural activities are completed, re-shape the roadbed to ensure that drainage systems are open.
6. Upon completion of the operation, depending upon slope, all haul roads with exposed soil must either be: graded or backdragged; or graded or backdragged and seeded and mulched (See SPECIFICATIONS FOR REVEGETATION OF DISTURBED SOIL.).

## SPECIFICATIONS FOR SKID TRAILS

### Definition

A skid trail is an unsurfaced, single lane, trail or narrow road usually narrower and sometimes steeper than a truck haul road.

### Purpose

This practice allows logs, tree lengths, or other roundwood products to be transported from the stump to a common landing or concentration area.

### Conditions Where Practice Applies

This practice is used where harvesting products requires centralization for sawing or loading on trucks or trailers and where topography and size of operation make skidding the primary and most economical means of collecting trees, logs or other roundwood products.

### Specifications

1. Locate log landings first and lay out skid trail approaches with grades 20% or less. Sound pre-harvest planning allows the location of major skid trails so as to avoid the problems associated with trail building on extreme slopes, minimize damage to the residual stand, reduce erosion and sedimentation, and provide the most economical method for skidding products.
2. Normally, gradients shall not exceed 20%. However, grades are permitted to be as steep as 25% for distances not greater than 200 feet. If steeper grades are necessary, practices must be approved and used to prevent concentrated water flow that causes gullies.
3. Typically, skid trails will be located outside the Streamside Management Zone (SMZ). If any equipment will be used in the SMZ (other than for stream crossings with an approved Waterway Construction Permit) a Custom Erosion And Sediment Control Plan or a SMZ Plan, prepared by a Maryland Licensed Forester, and approved by the appropriate plan approval authority (the SCD) will be required. Skid trails located within the SMZ shall be utilized so as to minimize disturbance to the humus layer. Skid trails located within the last 50 feet (adjacent to the body of water) shall be used only a limited number of times. Repair of damage to humus layer and stabilization shall be in accordance with the requirements set by this manual. (See SPECIFICATIONS FOR SMZ AND REVEGETATION OF DISTURBED SOILS).
4. Where crossings are needed, cross drains (culverts) are used to protect banks and water quality. Use methods such as layers of poles (corduroy) along the approach to provide temporary bank protection.

5. Cross perennial or intermittent streams, or drainage ditches that lead to natural drainage ways with bridges or culverts of acceptable design. Use of fords is only acceptable as described in the specifications for temporary stream crossings. Logs shall not be skidded through intermittent or perennial streams. Stream crossings will require a Waterway Construction Permit. Contact Maryland Department of the Environment - Water Management Administration for permitting information (See APPENDIX D.). Bridges are the preferred method for crossing streams.
6. Approaches to water crossings shall be as near to right angles to the stream direction as possible.
7. Avoid long steep grades; climb upslope on a slant or zigzag pattern.
8. Upon completion of skidding, the areas subject to erosion shall have water bars or other cross drainage structures installed immediately (See SPECIFICATIONS FOR WATER BARS.).
9. Any exposed soil resulting from the construction of the skid trail shall be stabilized in accordance with the 7/14 day criteria. This includes cut and fill slopes steeper than 3:1 and any perimeter slopes and sediment controls (See SPECIFICATIONS FOR REVEGETATION OF DISTURBED SOIL.)
10. Upon completion of the operation, depending upon slope, all skid trails with exposed soil must either be: graded or backdragged; or graded or backdragged and seeded and mulched (See SPECIFICATIONS FOR REVEGETATION OF DISTURBED SOIL.)



## SPECIFICATIONS FOR LOG DECKS AND LANDINGS

### Definition

Decks and landings are areas where logs are collected at the end of skid trails and haul roads. Also included are concentration yards near mills.

### Purpose

This practice establishes a centralized location where harvested timber products are collected for sorting and/or loading on trucks.

### Condition Where Practice Applies

This practice applies where harvest area is large enough to necessitate concentrating materials for loading.

### Specifications

1. This practice generally results in disturbance of the soil surface. Properly locate decks, landings and portable mill sites to minimize the chances of erosion or sedimentation.
2. Locate decks and portable mill sites in advance of road construction.
3. Locate portable mills and decks at least 50 feet from the upper limit of the Streamside Management Zone.
4. Sound pre-harvest planning will allow placement of landings and decks on optimal slopes and avoid the problems associated with building in extreme locations. Decks and yards must be located on reasonably level, (3 to 10 percent) well drained ground. If the site does not have any area with a slope of at least 3 percent, landings shall be located on the maximum slope of the site. If grades steeper than 10% are necessary, practices must be approved and used to prevent concentrated water flow that cause gullies.
5. Provide for adequate drainage on approach roads and trails so that surface water does not drain onto the deck area and cause ponding.
6. Provide a diversion ditch around the uphill side of decks to intercept the flow of surface water and direct it away from the deck.
7. Locate residue piles (sawdust, slabs, etc.) outside of wet weather drainages so that water from residue will not drain into adjacent streams or bodies of water.
8. Upon completion of the operation, depending upon slope, all decks, landings and portable mill locations with exposed soil must either be: graded or backdragged; or graded or backdragged and seeded and mulched (See SPECIFICATIONS FOR REVEGETATION OF DISTURBED SOIL.).

## SPECIFICATIONS FOR BROAD-BASED DIP

### Definition

This structure is a dip and reverse slope in a road surface with an out slope in the dip for natural cross drainage.

### Purpose

This practice provides cross drainage on insloped truck roads. This prevents buildup of excessive surface runoff and subsequent erosion.

### Conditions Where Practice Applies

This practice applies where truck haul roads and heavily used skid trails have a gradient of 10% or less. This practice is not for use for cross draining spring seeps, or intermittent or perennial streams.

Broad-based dips are very effective in gathering surface water and directing it safely off the road. Dips are placed across the road in the direction of water flow. This type of structure allows normal truck speeds without adding stress to the vehicle.

### Specifications

1. Installation takes place following basic clearing and grading for roadbed construction.
2. Begin construction by locating the discharge point; usually a low point in the road grade.
3. Compact the area and cover the dip with 3 inches of #2 stone (nominal dimension 2 inches) for conveyance of stormwater runoff and roadbed protection. The stone is not necessary if the roadbed is composed of shale or bedrock.
4. Place stone at the discharge point of water being channeled from the road surface.
5. All side cast material shall be stabilized with seed and mulch.
6. A 20-foot long, 3% reverse grade is constructed into the existing roadbed by cutting from upgrade of the dip location.
7. The cross drain outslope will be 3% maximum.
8. To reduce water velocity use an energy dissipater such as riprap or in most cases, a level area at the outfall of the dip where the water can spread.

9. Spacing of broad-based dips will be determined by the following formula:  
Spacing =  $400' / \text{Slope \%} + 100'$  (Note: Refer to spacing table.)  
For example:  $400 \text{ ft.} / 8\% + 100' = 50 \text{ ft.} + 100 \text{ ft.} = 150 \text{ ft.}$  apart

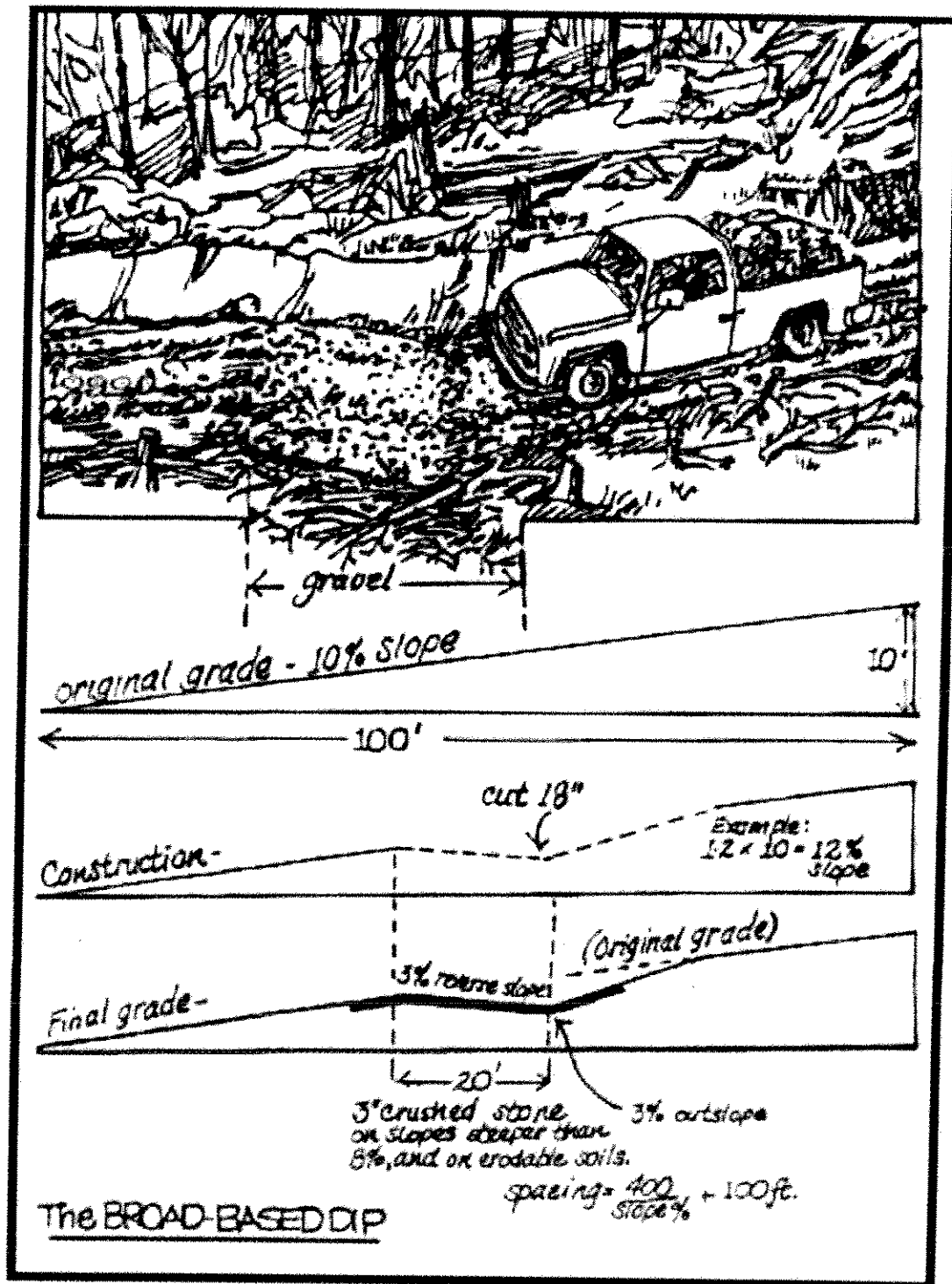
Or see Table 2.

Table 2 – Broad Based Dip Spacing vs. Road Grade

Road Grade (Percent)	Spacing Between Dips (feet)
2	300
3	234
4	200
5	180
6	165
7	155
8	150
9	145
10	140
12	135

An inherent problem in construction of a broad-based dip is recognizing that the roadbed consists of two planes rather than one unbroken plane. One plane is the 20-foot reverse grade toward the uphill road portion and outlet. Another plane is the grade from the top of a hump or start of a downgrade to the outlet of the dip. Neither the dip nor the hump is to have a sharp, angular break but is to be rounded to allow a smooth flow of traffic. These dips do not damage loaded trucks, or slow vehicle speed. Dips require minimal annual maintenance and continue to function years after abandonment. Only the dip is outsloped to provide sufficient break in grade to turn the water.

Diagram 5.0 – Broad-based Dip



## SPECIFICATIONS FOR ROLLING DIP

### Definition

This structure is a dip and reverse slope in a road surface with an outslope in the dip for natural cross drainage. This structure is to be used on roads that are too steep for broadbased dips.

### Purpose

This practice provides cross drainage on insloped truck roads. This prevents excessive surface runoff and subsequent erosion.

### Conditions Where Practice Applies

This practice applies where truck haul roads and heavily used skid trails have a gradient of 15% or less. This practice is not for use for cross draining spring seeps, or intermittent or perennial streams.

### Specifications

1. Installation takes place following basic clearing and grading for roadbed construction on skid trails.
2. A 10-foot to 15-foot long, 3% to 8% reverse grade is constructed into the existing roadbed by cutting from upgrade to the dip location and using cut material to build up the mound for the reverse grade.
3. Spacing of rolling dips will be determined by the following formula:

Spacing of broad-based dips will be determined by the following formula:

$$\text{Spacing} = 400' / \text{Slope \%} + 100' \text{ (Note: Refer to spacing table.)}$$

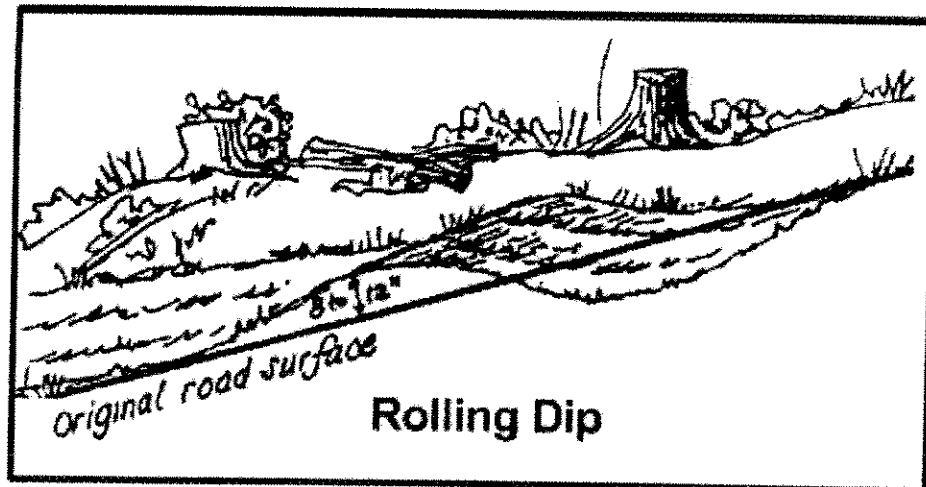
$$\text{For example: } 400 \text{ ft.} / 8\% + 100' = 50 \text{ ft.} + 100 \text{ ft.} = 150 \text{ ft. apart}$$

Or see Table 3.

Table 3 – Rolling Dip Spacing vs. Road Grade

Grade of Road (Percent)	Distance Between Rolling Dips (feet)
2 – 5	180
5 – 10	150
10 – 15	135
15+	120

Diagram 6.0 – Rolling Dip



## SPECIFICATIONS FOR WATER BARS

### Definition

A water bar is a post-harvest trench and berm constructed across a road or trail. On sandy soils, the trench is usually reinforced with a pole. This structure can also be called a water break.

### Purpose

This is a post-harvest practice. It is used to intercept and divert side-ditch and surface runoff from roads or trails that will not have vehicular traffic. This practice is used to minimize erosion and provide conditions suitable for natural or artificial re-vegetation.

### Conditions Where Practice Applies

This is a practice for use on road or trail grades where surface water runoff causes erosion of the exposed soil. Use only where there will not be any vehicular traffic. If there is a potential for vehicular traffic, use rolling dips.

### Specifications

1. Determine proper spacing between water bars using the following formula:  
$$1000 \div (\% \text{ grade} + 2.5) = \text{water bar spacing}$$

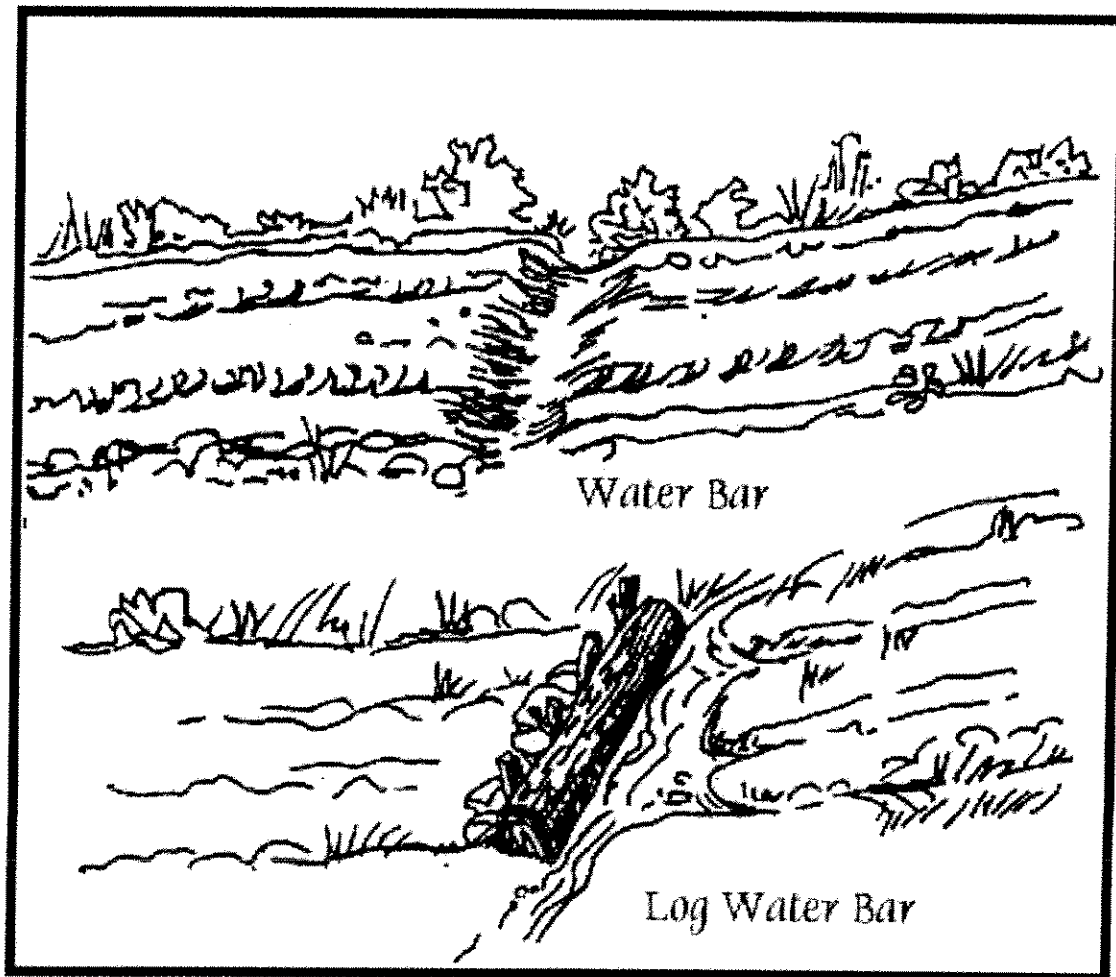
Table 4 – Water Bar Spacing vs. Road Grade

Grade of Road (%)	Approximate Distance Between Water Bars (ft)
2	230
5	135
10	80
15	60
20+	45

2. Water bars are to be at an angle of 30 to 45 degrees downslope to turn surface water off the road or trail.
3. Excavate a trench 3 to 4 inches below the surface of the road or trail with a 1 foot berm on the downhill side of the trench. Use spoil materials to develop the bar height.
4. The uphill end of the bar shall extend beyond the side ditch line of the road and tie into the bank to fully intercept any ditch flows.
5. The outflow end of the bar is to be fully opened and extend far enough beyond the edge of the road or trail to safely disperse runoff water onto the undisturbed forest floor.
6. On sandy soils, a five to eight inch diameter pole shall be placed in the full length of the trench. This pole shall be pegged and covered with soil on the downslope side.

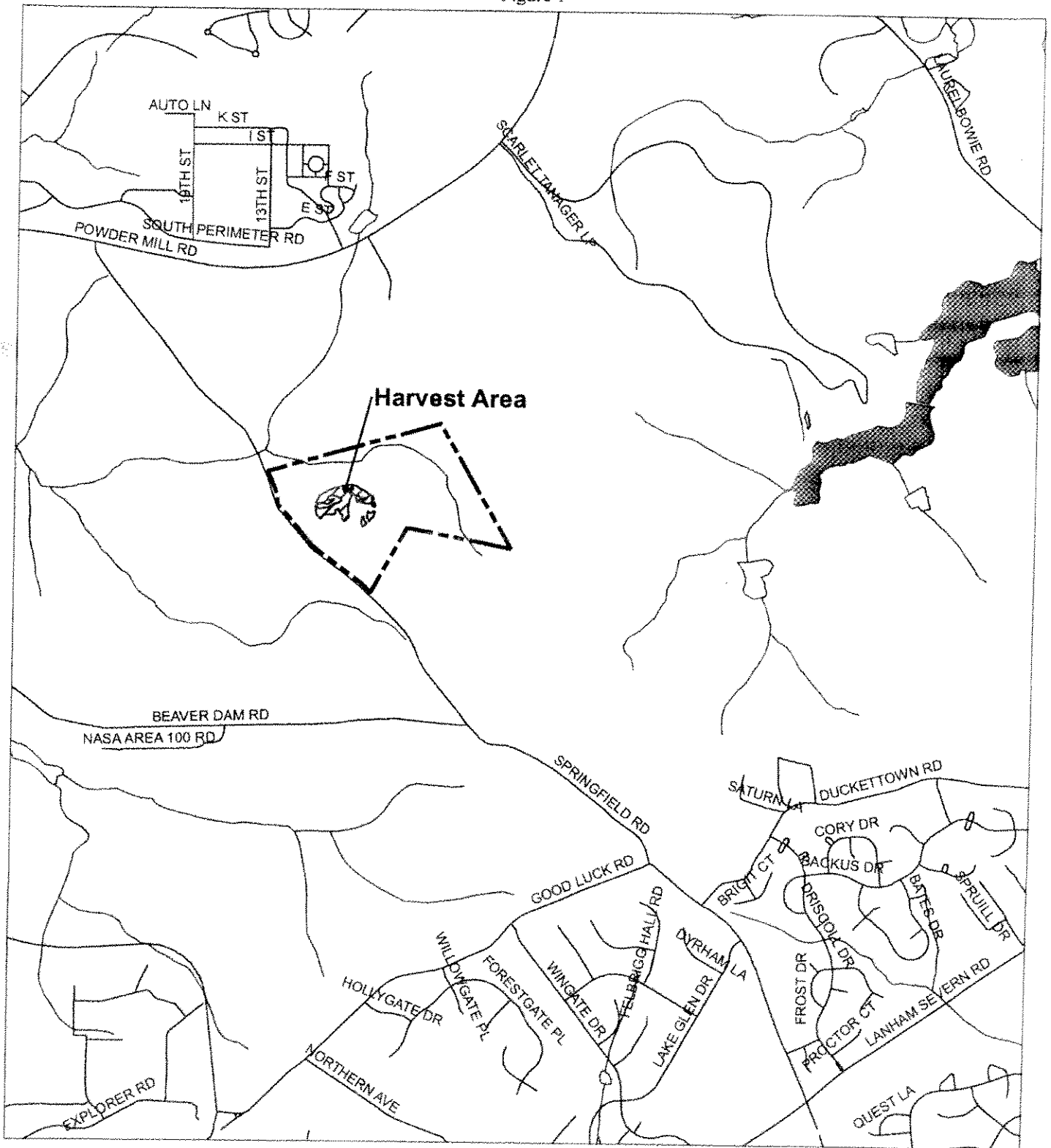
7. Ensure that the outlet is open and consider the need for energy dissipating water spreaders at or below drain outlet on sensitive areas.
8. Upon completion of the operation, exposed soil resulting from the creation of water bars must be seeded and mulched in accordance with the stabilization requirements for a haul road or skid trail. (See SPECIFICATIONS FOR REVEGETATION OF DISTURBED SOIL)

Diagram 7.0 – Water Bars

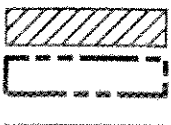


# Vicinity Map

Figure 1



## Legend



Harvest Area  
Property Boundary  
Streams

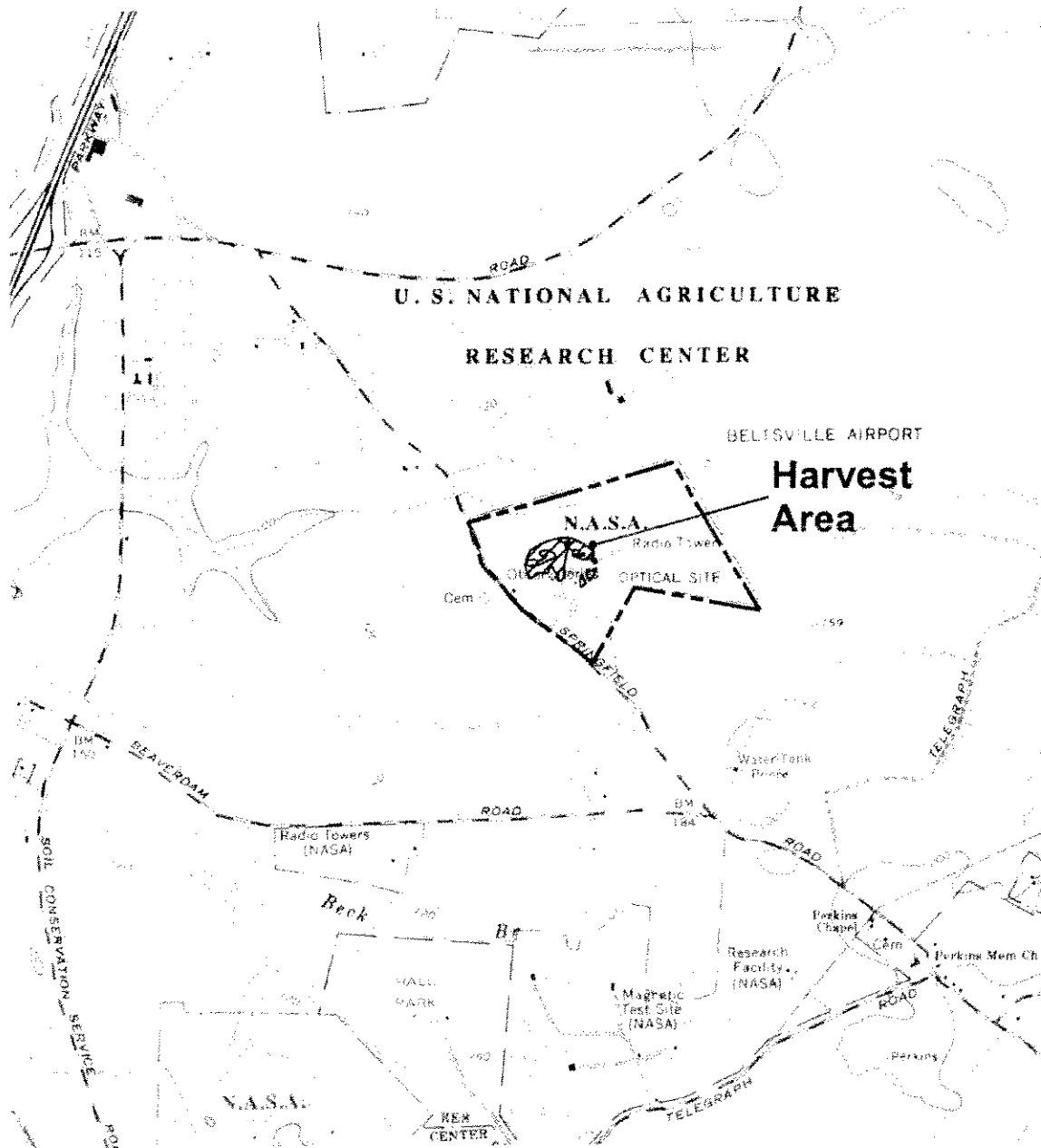


0 1,000 2,000 4,000 6,000 Feet

1 inch = 2,000 feet



# USGS Topographic Map (Laurel Quad)



## Legend

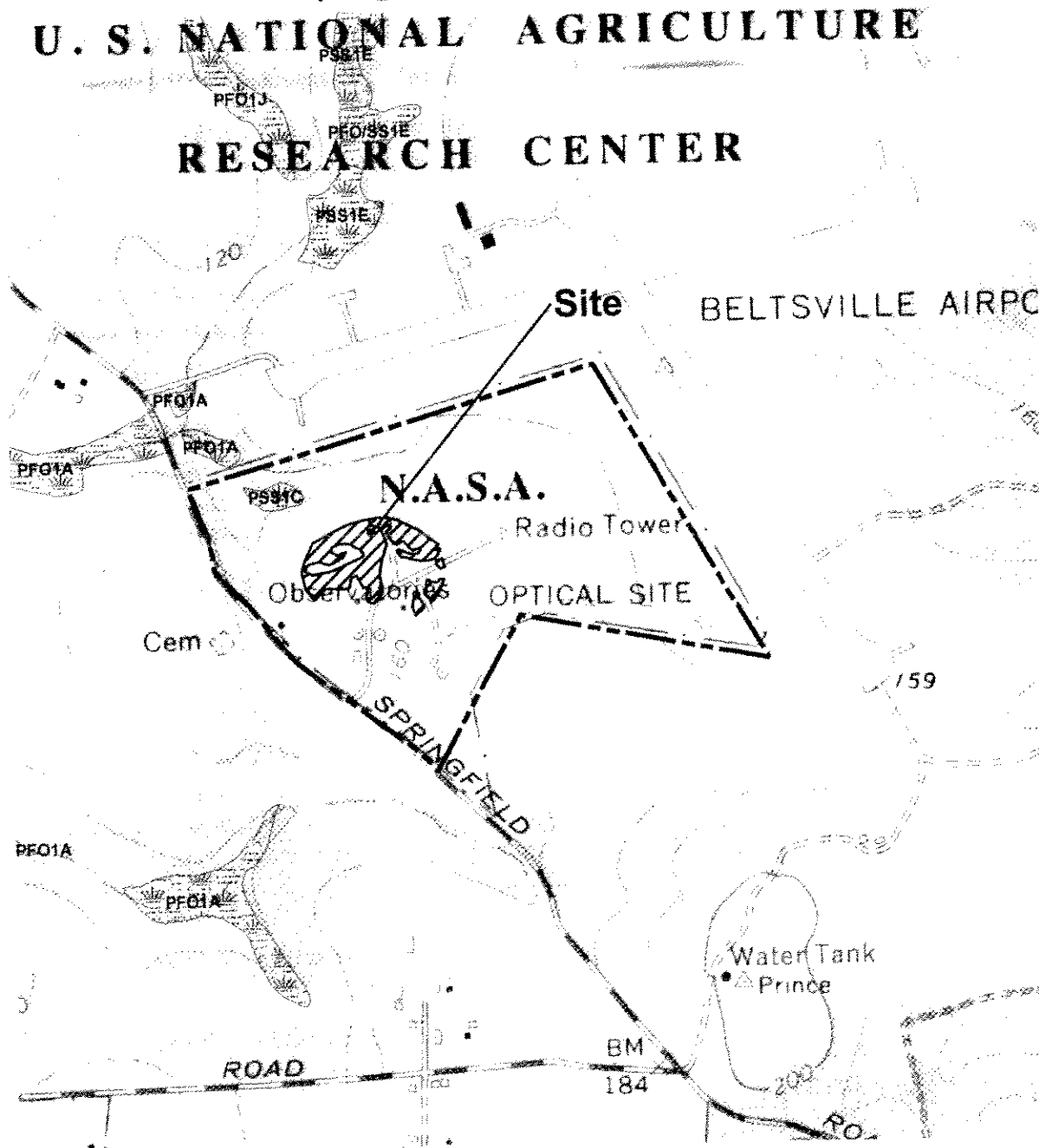
-  Harvest Area
-  Project




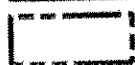


2,000 1,000 0 2,000 4,000 Feet

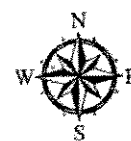
1 inch = 2,000 feet

# National Wetland Inventory Map and USGS Topographic Map (Laurel Quad) U. S. NATIONAL AGRICULTURE RESEARCH CENTER



## Legend

-  Harvest Area
-  Property Boundary
-  NWI Wetlands
-  NWI-Wetlands



1 inch = 1,000 feet

# Maryland Wetland Guidance Maps and Habitats of Special State Concern



## Legend

-  Harvest Area
-  Property Boundary
-  DNR Wetlands for Prince George's
-  Wetlands of Special State Concern
-  Habitat of Special State Concern



1 inch = 1,000 feet

